MACKENZIE MOUNTAIN
NON-RESIDENT and NON-RESIDENT ALIEN
HUNTER HARVEST SUMMARY
1997

Northwest Territories Resources, Wildlife & Economic Development

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MACKENZIE MOUNTAIN NON-RESIDENT and NON-RESIDENT ALIEN HUNTER HARVEST SUMMARY 1997

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Government of the Northwest Territories

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ABSTRACT

Data on harvest of big game in the Mackenzie Mountains of the Northwest Territories (NWT) by non-resident and non-resident alien hunters (collectively called 'non-resident' for this report) were recorded for the 1997 hunting season by each of the eight licenced outfitters that operate in the area and by Renewable Resource Officers with the Department of Resources, Wildlife, and Economic Development. The data recorded included: date(s) of harvest; tags held for each species; horn/antler measurements for Dall's sheep, woodland (mountain) caribou, moose, and mountain goats; age of Dall's sheep; location of kill sites; hunter effort; sex of mountain goats, wolves, wolverines, and black bears harvested; numbers of animals observed for each species (including grizzly bears); and a subjective rating of the overall hunting experience by each hunter.

Non-resident licences were bought by 352 hunters in 1997. Hunters from outside Canada (non-resident aliens) comprised 83% of all outfitted hunters in the Mackenzie Mountains and Canadians from outside the NWT, or NWT residents with less than 2 years residency (non-residents) comprised 17%. Of the 352 non-resident licence holders, 334 came to the N.W.T. and most spent at least some time hunting. *Outfitter Return on Client Hunter Success* forms were submitted by 346 non-resident licence holders in 1997. *Hunter Wildlife Observation Report* forms were voluntarily submitted by 168 non-resident hunters.

Non-resident hunters in the Mackenzie Mountains, NWT harvested 210 Dall's sheep, 168 woodland caribou, 44 moose, 2 mountain goats, 17 wolves, and 1 wolverine in 1997.

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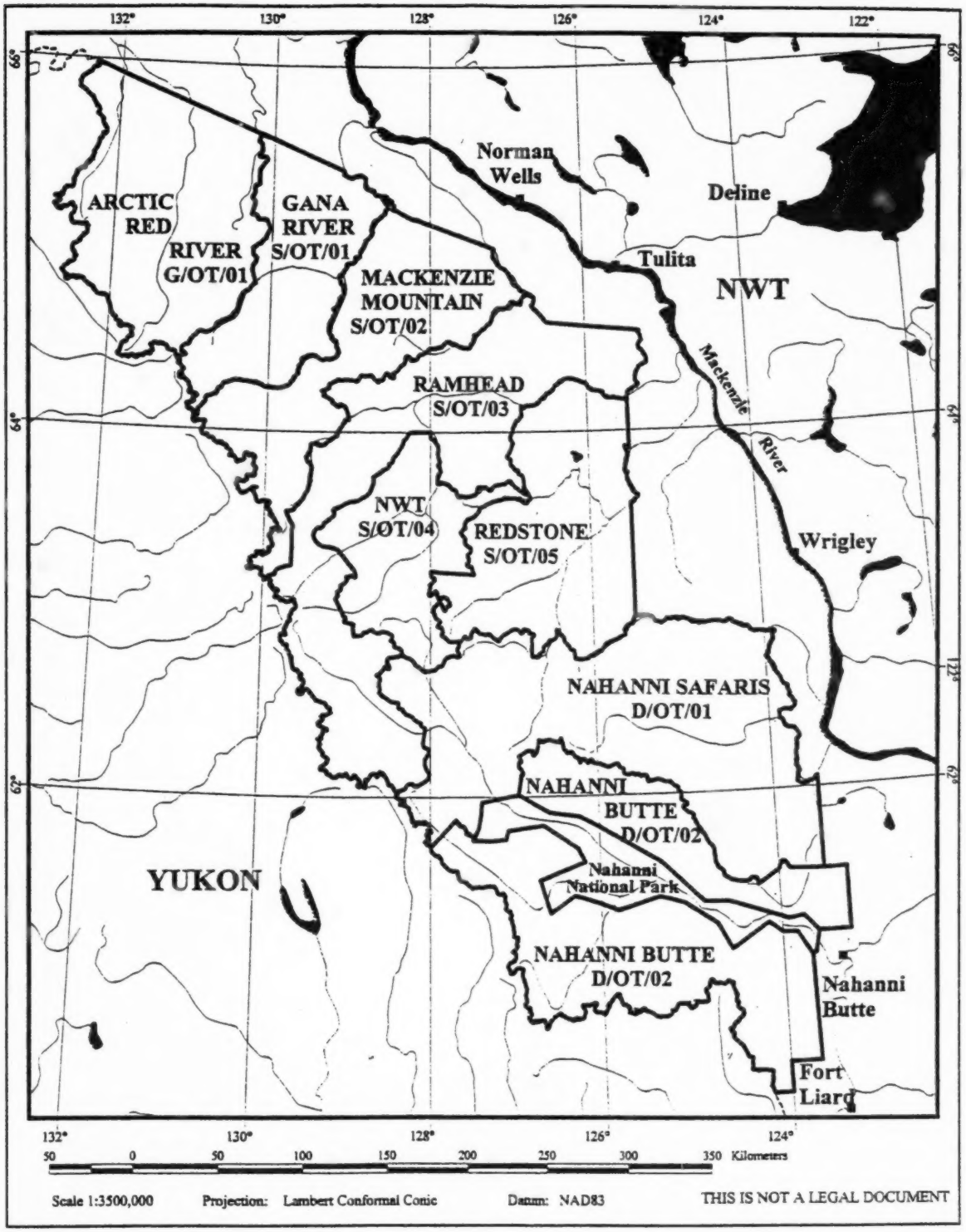


Figure 1. Outfitting zones in the Mackenzie Mountains, NWT – 1997.

INTRODUCTION

The Mackenzie Mountains of the western Northwest Territories (NWT) existed as a Game Preserve from 1938 to 1953 with hunting privileges extended solely to aboriginal people (Simmons 1968). The mountains were opened to non-resident hunters in 1965 (Simmons 1968) and over the last three decades the Mackenzies have become known around the world for big game hunting for the wilderness experience they offer. Eight outfitters are currently licenced to provide big game outfitting services within the Mackenzie Mountains (Figure 1; Appendix 2). Each has the exclusive privilege to provide services within their zone, which enhances the outfitter's ability to practice sustainable harvest through annual allocation of the harvest effort.

There are four classes of licenced big game hunters in the NWT:

1) *general* – subsistence harvesters, primarily aboriginal people.

2) *resident* - Canadian citizens or landed immigrants who have lived in the NWT for at least two consecutive years prior to application for the licence;

2) *non-resident* - Canadian citizens or landed immigrants who live outside the NWT, or have not lived within the NWT for two consecutive years prior to application for the licence; and

3) *non-resident alien* - non-Canadian citizens or landed immigrants.

All holders of big game hunting licences must be at least 16-years-old. For simplification in this report, we call both non-resident and non-resident alien hunting licence holders 'non-residents' and combine their harvest statistics.

The Department of Resources, Wildlife, and Economic Development (DRWED) in Norman Wells (Sahtu Region) annually monitors non-resident big game harvest in the Mackenzie Mountains. Seasons for each big game species vary slightly and the total non-resident hunting season lasts from 15 July to 31 October. There are currently no restrictions on the numbers of Dall's sheep, woodland caribou, mountain goats, moose, wolves, wolverine, and black bears that an outfitter can take within his company's zone.

Individual non-resident hunters are annually restricted to one each of the following big game species: Dall's sheep (male with at least ¾ curl horns), woodland caribou (either sex), moose (either sex), mountain goat (either sex), wolf (either sex), wolverine (either sex), and black bear (adult not accompanied by a cub or cubs). Non-resident hunting for grizzly bears was closed in 1982 as a result of concerns about over-harvest (Miller et al. 1982; Latour and MacLean 1994).

Each year the DRWED, under provisions laid out in the Northwest Territories *Wildlife Act*, requires that the outfitters submit an *Outfitter Return on Client Hunter Success* for each person that purchased a NWT non-resident big game hunting licence with them (Figure 2). These forms (known as *Outfitter Returns)* must be submitted whether or not a client actually hunted and whether or not any game was harvested.

The *Outfitter Returns* provide a basis to annually monitor the activities of non-resident hunters in the Mackenzie Mountains and to help ensure that the harvest of each species is within sustainable limits (Latour and MacLean 1994; Veitch and Popko 1996; Veitch and Popko 1997; Veitch et al., *in press*). In addition to the *Outfitter Returns* we request all non-resident hunters to voluntarily provide reports of the wildlife they saw while hunting. These data are recorded on a separate form, the *Hunter Wildlife Observation Report* (Figure 3).

This is the third consecutive year that a summary of the data collected by DRWED on non-resident hunters in the Mackenzie Mountains has been made available to people and organizations interested in the outfitting industry and the region's wildlife populations (Veitch and Popko 1996, 1997). We hope that the information is of interest and use to the outfitters, the communities, land claim settlement area wildlife co-management boards, people involved in promotion of tourism in the western Arctic, to the hunters, and to anyone else with an interest in the Mackenzie Mountains.

Figure 1 - 190 - Alternative Outfitter Return on Client Hunter Success Form

DEPARTMENT OF RENEWABLE RESOURCES
PURSUANT TO THE WILDLIFE ACT

OUTFITTER RETURN ON CLIENT HUNTER SUCCESS

MINISTÈRE DES RESSOURCES RENOUVELABLES
LOI SUR LA FAUNE

RAPPORT DU POURVOYEUR SUR LES RÉSULTATS DE CHASSE D'UN CLIENT

OR XXXXXX

INSTRUCTIONS

Address - Adresse | Community - Communauté | Postal Code - Code postal NT

OUTFITTER/CLIENT HUNTER - POURVOYEUR/CLIENT CHASSEUR

Outfitter Name - Nom du pourvoyeur | Client Hunter Last Name - Nom de famille du client chasseur | First Name - Prénom | Initial - Initiale | Hunting Lic. No. - N° de permis de chasse

RETURN FOR THE PERIOD OF - RAPPORT MENSUEL POUR

Month - Mois | Year - Année

BIG GAME HUNTED - GROS GIBIER CHASSÉ (If none killed complete "No. of Days Hunted" for each species hunted - Si aucun animal n'a été abattu remplir la partie «Nombre de jours à la chasse» pour chaque espèce chassée)

Species - Espèce	Tag No. - N° de l'empreinte	No. of Days Hunted - Nombre de jours à la chasse	Locality - Région	Quota Lic. No. - N° de licence du quota	Kill Date - Date de l'abattage	Left Horn Length - Longueur de la corne gauche	Right Horn Length - Longueur de la corne droite	Miscellaneous - Divers
MOOSE AND CARIBOU L'ORIGNAL ET LE CARIBOU								Right Antler Length - Longueur du bois droit ___ cm Left Antler Length - Longueur du bois gauche ___ cm Widest Antler Spread - Largeur de ramure aux plus longs ___ cm
MOOSE L'ORIGNAL								Right Horn Length - Longueur de la corne droite ___ cm Left Horn Length - Longueur de la corne gauche ___ cm Base - Base ___
MOUNTAIN GOAT CHÈVRE DE MONTAGNE								Horn Length - Longueur de la corne ___ cm Aquatics - Aquatique Base - Base ___
POLAR BEAR OURS POLAIRE								No. Taken - Quantité apriquée Size - Taille
BARREN GROUND CARIBOU CARIBOU DE LA TOUNDRA								No. Taken - Quantité apriquée Size - Taille
Other species - Autre espèce								No. Taken - Quantité apriquée Size - Taille
Other species - Autre espèce								No. Taken - Quantité apriquée Size - Taille
Other species - Autre espèce								No. Taken - Quantité apriquée Size - Taille
Other species - Autre espèce								No. Taken - Quantité apriquée Size - Taille
WALRUS MORSE OU LE WALRUS	Plug No. - N° de prélèvement	Seal No. - N° de sceau	Left Ulna - N° de plaque	Right Horn Beams - Longueur de la corne droite	Left Horn Beam - Longueur de la corne gauche	Right Horn Length - Longueur de la corne droite	Left Horn Length - Longueur de la corne gauche	Approved - Longueur entre les tubercules Recovered - Corps récupéré Right Tusk - Défense droite Left Tusk - Défense gauche Sex - Sexe

COMMENTS - COMMENTAIRES

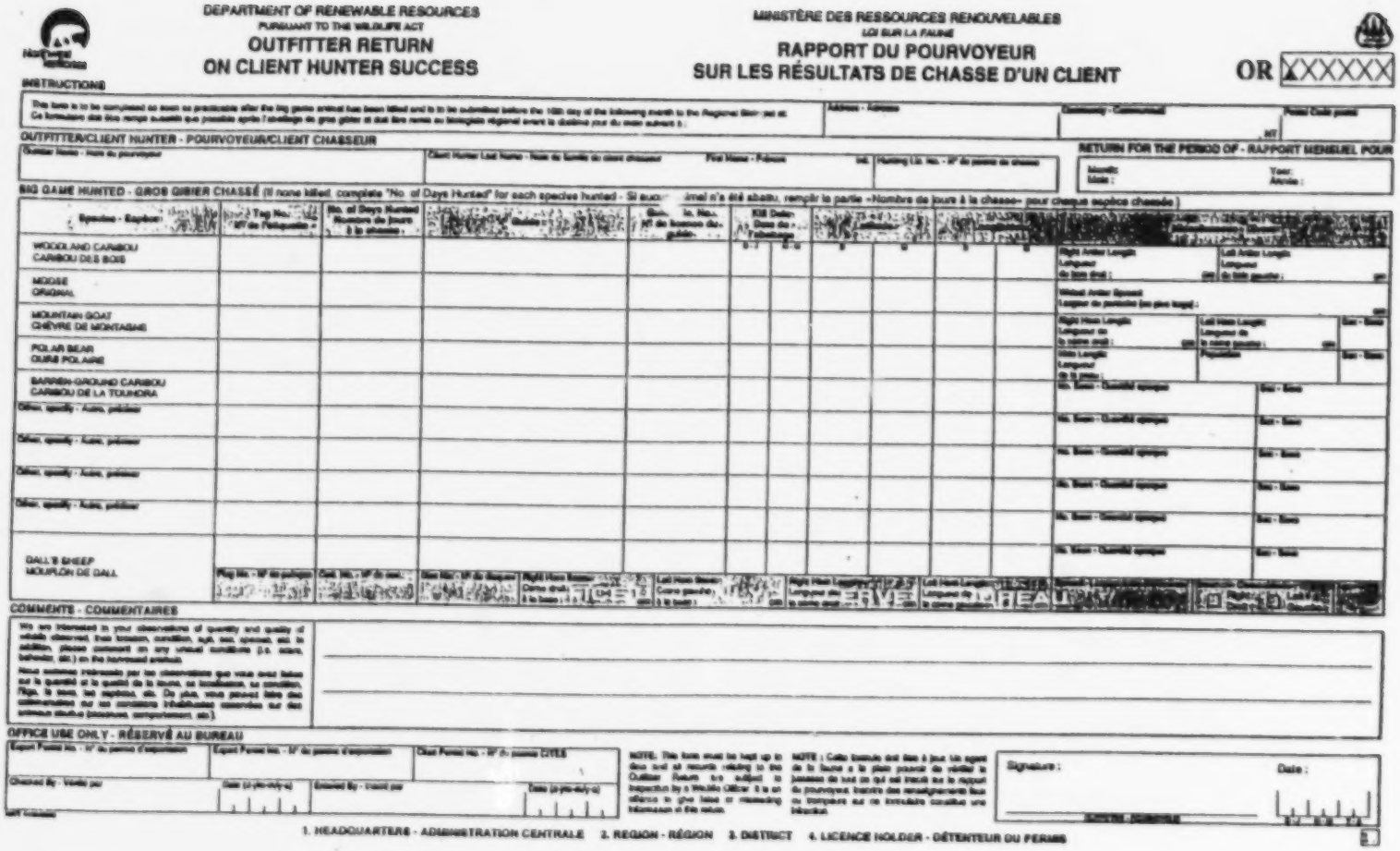
OFFICE USE ONLY - RÉSERVÉ AU BUREAU

Export Permit No. - N° du permis d'exportation | Export Permit No. - N° du permis d'exportation | Date Permit No. - N° du permis délivré

Checked By - Vérifié par | Date | Entered By - Entré par | Date

Signature | Date

1 HEADQUARTERS - ADMINISTRATION CENTRALE 2 REGION - RÉGION 3 DISTRICT 4 LICENCE HOLDER - DÉTENTEUR DU PERMIS



DEPARTMENT OF RENEWABLE RESOURCES
PURSUANT TO THE WILDLIFE ACT

OUTFITTER RETURN ON CLIENT HUNTER SUCCESS

MINISTÈRE DES RESSOURCES RENOUVELABLES
LOI SUR LA FAUNE

RAPPORT DU POURVOYEUR SUR LES RÉSULTATS DE CHASSE D'UN CLIENT

OR XXXXXX

INSTRUCTIONS

OUTFITTER/CLIENT HUNTER - POURVOYEUR/CLIENT CHASSEUR

RETURN FOR THE PERIOD OF - RAPPORT MENSUEL POUR

BIG GAME HUNTED - GROS GIBIER CHASSÉ (If none killed, complete "No. of Days Hunted" for each species hunted - Si aucun animal n'a été abattu, remplir la partie «Nombre de jours à la chasse» pour chaque espèce chassée)

Species - Espèce	Tag No. - N° de l'étiquette	No. of Days Hunted - Nombre de jours à la chasse	Kill Date - Date de l'abattage	Sex - Sexe
WOODLAND CARIBOU / CARIBOU DES BOIS				
MOOSE / ORIGNAL				
MOUNTAIN GOAT / CHÈVRE DE MONTAGNE				
POLAR BEAR / OURS POLAIRE				
BARREN-GROUND CARIBOU / CARIBOU DE LA TOUNDRA				
Other, specify - Autre, préciser				
Other, specify - Autre, préciser				
Other, specify - Autre, préciser				
Other, specify - Autre, préciser				
DALL'S SHEEP / MOUFLON DE DALL				

COMMENTS - COMMENTAIRES

OFFICE USE ONLY - RÉSERVÉ AU BUREAU

NOTE: The form must be kept up to date and all records relating to the Outfitter Return to be subject to inspection by a Wildlife Officer. It is an offence to give false or misleading information in this return.

NOTE : Cette formule doit être à jour. Un agent de la faune a le plein pouvoir de vérifier la justesse de tout ce qui est inscrit sur le rapport du pourvoyeur. Inscrire des renseignements faux ou trompeurs sur ce formulaire constitue une infraction.

Signature :

Date :

1. HEADQUARTERS - ADMINISTRATION CENTRALE 2. REGION - RÉGION 3. DISTRICT 4. LICENCE HOLDER - DÉTENTEUR DU PERMIS

Figure 2. 1997 Mackenzie Mountain *Outfitter Return on Client Hunter Success* form.

MACKENZIE MOUNTAINS, N.W.T.
HUNTER WILDLIFE OBSERVATION REPORT
1997

The following information is requested by the Dept. of Resources, Wildlife, and Economic Development, G.N.W.T. in order to assist us with management of Mackenzie Mountain big game populations. All the requested information is completely voluntary, but your providing it to us is most appreciated.

HUNTER INFORMATION

Last Name	First Name and Initials	
Address - number and street, box number	Town, City	Province, State, Country

Hunting Licence# _____ Outfitting Zone: _____ Company: _____

Start Date of Hunt _____ 1997 End Date of Hunt _____ 1997 Observations Made Over _____ Days

ESTIMATED NUMBER OF DALL'S SHEEP SEEN			
3/4 and Full Curl Rams	Less than 3/4 Curl Rams	Ewes	Lambs

ESTIMATED NUMBER OF WOODLAND CARIBOU SEEN		
Bulls	Cows	Calves

ESTIMATED NUMBER OF MOOSE SEEN		
Bulls	Cows	Calves

ESTIMATED NUMBER OF MOUNTAIN GOATS SEEN			
Billys	Nannys	Kids	Unknown Age

OTHER SPECIES

	Wolf	Wolverine	Black Bear Adult	Black Bear Cub	Grizzly Bear Adult	Grizzly Bear Cub
Number Seen						

How would you rate your overall hunting experience in the Mackenzie Mountains?
Excellent _____ Very Good _____ Good _____ Fair _____ Poor _____

Was this your first time hunting the Mackenzie Mountains? ____ Yes ____ No
If no, how many times have you hunted in the Mackenzie Mountains before 1997? ____
If yes, do you plan to return to hunt in the Mackenzie Mountains again? ____ Yes ____ No

Did you bowhunt in the Mackenzie Mountains in 1997? ____ Yes ____ No
If yes, check which of the following species you bowhunted:
____ sheep ____ caribou ____ moose ____ mountain goat ____ wolf ____ wolverine ____ black bear.

Comments: _____

_____

_____

_____

_____

(please continue on the reverse if neccessary)

Thank You! Please give this form to the Officer or Clerk when you are exporting your trophies, or to the guide/outfitter with whom you hunted. We would appreciate receiving this form whether or not you harvested an animal(s).

Figure 3. 1997 Mackenzie Mountain *Hunter Wildlife Observation Report* form.

METHODS

Prior to the start of the 1997 hunting season, each outfitter in the Mackenzie Mountains received sufficient copies of the 1997 *Outfitter Return* and *Hunter Wildlife Observation Report* (*Observation Report*) forms for all their clients for the year. Under the *Wildlife Business Regulations* the DRWED requires that the *Outfitter Returns* be returned by the tenth day of the month after the month of the hunt for each non-resident hunting licence holder. Those forms, and the voluntary *Observation Reports*, were submitted to the senior author whether or not a client actually hunted and whether or not harvest occurred. In cooperation with the outfitters, persistent attempts were made to obtain complete, signed *Outfitter Returns* for every non-resident that obtained a big game hunting licence. Where an *Observation Report* form was received, we recorded wildlife observations directly from the form. When no *Observation Report* was received but observation data were recorded on the *Outfitter Return*, we entered the data from the *Outfitter Return*.

Where possible, data from the outfitter returns were cross-checked with the DRWED *Game Licencing* central database maintained in Yellowknife, with GNWT wildlife *Export Permit* forms, and with records of sequentially numbered, unique identifier plugs inserted in legally harvested rams maintained by DRWED offices across the western NWT. After verification, all data were entered onto *Excel 5.0* (Microsoft Corporation) spreadsheets for analyses.

RESULTS and DISCUSSION

Hunters

Non-resident and non-resident alien big game hunting licences for the Mackenzie Mountains, NWT were bought by 352 persons in 1997. Of those, 334 (95%) came to the NWT and most spent at least some time hunting; 18 either canceled their hunts or decided not to hunt after arriving in the NWT. Licence sales in 1997 were down 9% from the 387 sold in 1996 (Veitch and Popko 1997). This decline was almost totally due to a decline in sale of non-resident licences to Canadian citizens. Ninety-two non-resident licences were sold in 1996 (24% of all licences sold), but this was down to 60 in 1997 (17% of all licences sold). The difference is possibly a result of the decrease in the value of the Canadian dollar versus its US counterpart between 1996 and 1997, since outfitters charge clients in $US. Numbers of hunters from the United States and Europe were both essentially unchanged from 1996 to 1997.

We received mandatory *Outfitter Returns* from 346 (98%) hunting licence holders. Voluntary *Hunter Observation Reports* were received from 50% of the 334 hunters who spent some time hunting in the Mackenzie Mountains in 1997. On the *Hunter Wildlife Observation Report* each hunter was asked to rank his or her experience in the Mackenzie Mountains from poor to excellent. Responses were received from 144 hunters (86% of hunters that submitted *Observation Reports*) and 94% expressed a high degree of satisfaction with their outfitter and their Mackenzie Mountain hunting experience (Table 2). As in 1996, the hunters' comments show considerable dissatisfaction expressed at the inability to hunt for grizzly bears and with logistical problems involved in export of trophies from some outfitting zones. All comments received are provided in Appendix 1.

On the *Observation Report* we asked hunters if they had bowhunted in 1997 and 13% of those hunters that completed the report indicated that they had.

Table 1. Province or country of origin for 352 non-resident and non-resident alien big game hunting licence holders in the Mackenzie Mountains, NWT - 1997.

Canada		United States		Europe		Other	
NWT/Yukon	0	Eastern States[1]	123	Austria	13	Russia	3
British Columbia	16			Denmark	1		
Alberta	38	Western States[2]	129	UK	1		
Saskatchewan	3			Germany	13		
Manitoba	2	State Unknown	3	Italy	4		
Ontario	1			Spain	2		
Quebec	0						
Atlantic Provinces	0						
Total	60		255		34		3

[1] AL, AR, CT, DE, DC, FL, GA, IL, IN, IA, KY, LA, ME, MD, MA, MI, MN, MS, MO, NH, NJ, NY, NC, OH, PA, PR, RI, SC, TN, VT, VA, VI, WV, WI

[2] AK, AZ, CA, CO, HI, ID, KS, MT, NB, NV, NM, ND, OK, OR, SD, TX, UT, WA, WY

Table 2. Mackenzie Mountain outfitted non-resident hunter satisfaction ratings, 1997.

Ranking	Number of Responses	Percent of All Responses
Excellent	113	78.5
Very Good	25	17.4
Good	4	2.8
Fair	1	0.7
Poor	1	0.7

Dall's Sheep (*Ovis dalli*)

Tags to hunt Dall's sheep were purchased by 71.6% (N = 252) of non-resident hunters – up from 65% in 1996 and 64% in 1995 (Veitch and Popko 1996, 1997). At least 86% of sheep tag holders pursued Dall's sheep and they harvested 210 rams. The average length of a sheep hunt was 4.3 $\pm$ 2.6 days, a slight decrease from 5.0 $\pm$ 3.0 days in 1996, 5.1 $\pm$ 2.9 days in 1995, and the 5.3 day average reported by Latour and MacLean (1994) for the period 1979 to 1990.

The non-resident harvest comprises $\geq$90% of the total annual harvest of Dall's sheep (Veitch et al. in press). The 1997 non-resident harvest was the highest recorded since 1991 and removed 0.8 to 1.5% of the estimated 14,000 to 26,000 Dall's sheep in the Mackenzie Mountains (Veitch et al. in press). It appears the current harvest level is sustainable provided that hunting pressure is distributed evenly across each of the zones.

The average age of rams taken by non-residents was 10.0 $\pm$ 1.5 years (range 6.5 to 14.5 years), which is the highest yet recorded for a single year since hunting began in 1965. One hundred and three (49.5%) of the 206 aged rams were > 10-years-old and 21 (10.1%) were > 12-years-old. The age structure of the harvest for each year since 1991 is provided in Appendix 4.

There has been remarkable consistency from 1979 to 1997 in the mean outside contour length of the right horns from rams harvested by non-residents (Appendix 3), which is surprising given the increase in average age during that same period. We expect to see more broomed, or broken, horn tips on older animals, since horn breakage generally occurs as a result of fights between rival males (Geist 1993). In 1997, brooming was noted on 62 of 203 (31%) of left and on 66 of 203 (33%) of right horns. This was down slightly from 34% of left and 38% of right in 1996, which is surprising given the increase in the proportions of animals taken that were in the older age classes (Appendix 4).

Each year we ask hunters to report their observations of numbers and age/sex classes of sheep to assist us in assessing the population dynamics of Dall's sheep in the Mackenzie Mountains. From the hunters' observations in 1997 (Table 4) we calculated there were 57 lambs per 100 ewes, an increase from 44 per 100 in 1996 and 55 per 100 in 1995. For the Richardson Mountains of the northern Yukon and NWT, Nagy and Carey (1991) suggest that

their August lamb: ewe ratio of 43 per 100 would allow their observed 10.5% average annual rate of increase from 1986 to 1991. Jorgenson (1992) summarized 17 years of lamb: ewe classification data for a herd of bighorn sheep in westcentral Alberta and found a mean of 43 lambs per 100 ewes in September (range 25 to 54 per 100).

We calculated there were 55 rams per 100 ewes in 1997, a sharp decrease from 82 per 100 in 1996 (Veitch and Popko 1997). This is a surprising decrease given the decrease in the average length of hunts in 1997 versus 1996, and the inherent bias in hunter observations towards mature rams. In July and August, when most hunting occurs, ram groups are normally segregated from nursery groups (Geist 1971; Simmons 1982; Barichello et al. 1987).

In 1996, hunters reported seeing a mean of 10.0 legally harvestable rams per hunter (172 hunters reporting) and 50% of all rams observed were ≥ ¾ curl (Veitch and Popko 1997). The 205 hunters that reported observations in 1997 only saw a mean of 7.5 rams with horns at least ¾ curl, but again 49% of all rams seen were in this class (Table 5). The 25% decrease in the mean number of legally harvestable rams observed per hunter is difficult to explain with the decrease in average hunt length.

Table 3. Horn measurements (cm) taken by Department of Resources, Wildlife & Economic Resources personnel for Dall's sheep rams harvested by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

	Contour Length		Base circumference		Tip to tip spread
	Left	Right	Left	Right	
Number	203	203	203	203	203
Mean	90.3	89.9	33.3	33.2	59.7
Standard deviation	8.7	8.2	1.9	2.0	7.9
Maximum	110.5	108.5	39.0	38.5	85.0
Minimum	51.4	66.0	27.1	27.2	40.0

Table 4. Dall's sheep observations reported by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

	Number of hunters reporting	Number observed	Mean number observed	Percent of sheep classified
Rams	209	3124	14.9	26.0
Ewes[1]	208	5667	27.2	47.2
Lambs	205	3223	15.7	26.8
Unknown	65	1689	26	n/a

[1] includes females >1-yr-old, yearlings, and younger rams. Also called 'nursery sheep'.

Table 5. Classification of Dall's sheep rams observed by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

Ram class	Number of hunters reporting	Number classified	Mean number classified	Percent of rams classified
Horns ≥ ¾ curl	205	1538	7.5	49.2
Horns < ¾ curl	205	1586	7.7	50.8

Woodland Caribou (*Rangifer tarandus caribou)*

Tags to hunt woodland caribou were purchased by 74% (N = 260) of non-resident licence holders, up from 65% in 1995 and 71% in 1996 (Veitch and Popko 1996, 1997). At least 78% of tag holders hunted caribou and they harvested 168 animals, down slightly from 172 in 1996. The average length of a woodland caribou hunt was 4.1 ± 3.0 days. For the period 1979 to 1990, the average length of a woodland caribou hunt was 3.5 days (Latour and MacLean 1994), but this increased to 4.5 and 4.3 days in 1995 and 1996, respectively. There is no apparent relationship between hunter effort and subsequent numbers harvested.

The mean right antler length of caribou harvested by non-residents was the same in 1997 (Table 6) as in 1995 (116.5 cm) and 1996 (116.4 cm) . Therefore, there is also no apparent relationship between trophy size and hunter effort for woodland caribou.

From the hunters' observations of woodland caribou (Table 7) we calculated ratios of 36 calves and 21 bulls per 100 cows. In 1995 and 1996, a mean of 30 bulls were seen by those hunters that reported their observations, whereas this declined to 24 in 1997. The calculated ratio of bulls to cows in 1997 was almost half the 40 per 100 recorded in 1996 (Veitch and Popko 1997). Only 13% of caribou observed were bulls, down from 21% in 1996. Bergerud (1978) summarized data for eight North American caribou populations that were either unhunted or hunted non-selectively (i.e., both males and females included in harvest) and found that the bull component for those herds averaged 39%. The situation in the Mackenzie Mountains needs to be more fully investigated to determine if the hunters' observations are reflecting a real shortage of males in harvested herds. We are not seeing a drop in harvest, and the effort required to obtain a trophy quality bull has decreased, so it is difficult to explain the decreased number of bulls observed by non-resident hunters.

Table 6. Antler measurements (cm) taken by licenced guides for woodland caribou bulls harvested by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

	Contour length		Antler spread (tip to tip)
	Left antler	Right antler	
Number measured	131	131	17
Mean (average)	116.6	116.2	85.5
Standard deviation	12.5	12.8	17.6
Maximum	160.0	164.0	114.5
Minimum	90.0	86.5	57.0

Table 7. Woodland caribou observations reported by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

Age/sex class	Number of hunters reporting	Number Observed	Mean number observed	Percent of total classified
Bulls	185	4361	23.6	13.3
Cows	184	20,947	113.8	63.7
Calves	185	7575	40.9	23.0

Moose (*Alces alces)*

Tags to hunt moose were purchased by 21% (N = 73) of non-resident hunters, which is similar to previous years. The harvest of 44 bulls by the 51 tag holders known to have hunted moose is similar to the 1991 to 1996 mean annual harvest of 45 (Veitch and Popko 1997). Moose hunts averaged 4.3 $\pm$ 2.9 days, which is unchanged from 1996 (4.3 days) and 1995 (4.4 days).

The average tip-to-tip spread of antlers from bull moose harvested by non-residents in 1997 was slightly higher than the 143.7 cm recorded in 1996 and 142.4 cm in 1995. However, the maximum of 163 cm in 1997 was substantially less than the 180 and 188 cm recorded in 1995 and 1996, respectively.

From the hunters' observations we calculated ratios of 30 calves and 107 bulls per 100 cows, increases from the 26 calves and 76 bulls per 100 cows reported in 1996; however, calves as a percent of all moose classified was essentially unchanged from 1996 to 1997. The low percentage of moose calves observed in each of the last two years is of concern because aerial surveys of moose near Norman Wells in November 1984, 1989, and 1992 documented > 40 calves per 100 cows (Veitch et al. 1996). Similarly, a survey of moose in the vicinity of Fort Good Hope in November 1992 found 53 calves: 100 cows (MacLean 1994a) and a November 1993 survey in the Tulita area recorded 60 calves per 100 cows (MacLean 1994b)

Table 8. Antler measurements (cm) taken by licenced guides for bull moose harvested by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

	Antler spread
Number measured	33
Mean	147.2
Standard deviation	13.0
Maximum measure	163.0
Minimum measure	117.0

Table 9. Moose observations reported by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

Age/sex class	Number of hunters reporting	Number observed	Mean number observed	Percent of total classified
Bulls	105	321	3.1	45.3
Cows	104	299	2.9	42.2
Calves	104	89	0.9	12.6

Mountain Goat (*Oreamnos americanus*)

Mountain goat tags were purchased by 8% (N = 30) of non-residents, a substantial increase from the 14 tags purchased in 1996 and 16 in 1995. However, only 5 tag holders reported that they hunted mountain goats. The 1997 harvest was 2 goats (one male and one female), which was considerably less than the 1991-1996 average of 6 per year. Goat hunts ranged from 1 to 6 days and averaged 3.2 $\pm$ 2.6 days.

Mountain goats occur in the southwest portion of the mountains in the NWT and reports of sightings (N = 17) were only received from the two southernmost outfitting zones.

Table 10. Horn measurements (cm) taken by licenced guides for mountain goats harvested by non-resident hunting licence holders in the Mackenzie Mountains, 1997.

	Total length	
	Left horn	Right horn
Number measured	2	2
Maximum measure	22.0	23.0
Minimum measure	20.5	20.5

Carnivores

Wolf (Canis lupus)

Wolf tags were purchased by 59% (N = 209) of non-resident licence holders. At least 35% of tag holders hunted and they harvested 17 wolves, which was the highest recorded annual harvest since the start of non-resident hunting in 1965. The 1991-1996 average annual wolf harvest was 11 animals. Wolf hunts averaged 5.9 $\pm$ 3.2 days in 1997.

One hundred and forty-one hunters recorded whether or not they had seen wolves. Of those, 77 observed at least one wolf and a total of 203 wolves was recorded. Wolves were reported from all eight zones.

Wolverine (Gulo gulo)

Wolverine tags were purchased by 38% (N = 135) of non-resident hunters. At least 38 tag holders hunted wolverines and they harvested one animal. The average length of a wolverine hunt was 7.0 $\pm$ 3.2 days.

Thirty-six wolverines were seen by the 116 hunters that reported their observations; 26% of those hunters saw at least one wolverine. Wolverines were reported from all zones except D/OT/02.

Black Bear (Ursus americanus) and Grizzly Bear (U. arctos)

Eight black bear tags were purchased by non-resident hunters in the Mackenzie Mountains in 1997 but no bears were harvested by the 5 hunters that spent some time hunting the species. Black bears are still virtually unknown for the northern half of the mountains and rare in the south. Only five black bears were reported in 1997, down from 11 in each of 1995 and 1996. All but one reported observation in 1997 came from the three southernmost zones. It is likely that interspecific competition with grizzly bears limits the distribution and numbers of black bears in the Mackenzie Mountains (Herrero 1972, 1978; Veitch and Harrington 1996).

The Mackenzie Mountains are not open to non-resident hunting of grizzly bears, which is a source of considerable frustration to outfitters and non-resident hunters, as is clearly shown by the comments received this year (Appendix 1) and 1996 (Veitch and Popko 1997).

In 1997 we had many more hunters report their grizzly bear sightings, if any, than in 1996; however, they reported 376 bears (Table 11), a decrease of 97 bears (21%) from the 473 (377 adults and 96 cubs) reported in 1996 (Veitch and Popko 1997). Again in 1997 we had a low cub to adult ratio, with only 19% of bears seen classified as cubs. Since cub grizzlies in the Mackenzies tend to stay with their mothers for 3 years (Miller et al. 1982), 'cub' refers to cubs-of-the-year, yearlings, and 2-year-olds. In comparison to other northern grizzly bear populations, the cub component of the Mackenzie Mountain grizzly population is at the very low end of the scale (cf. Nagy et al. 1983a, 1983b). Miller et al. (1982) found that Mackenzie Mountain grizzlies have a very low reproductive rate, with cubs not produced by any females less than 8-years-old, a mean litter size of 1.8, and an average inter-litter interval of 3.8 years. It is not known if the low proportion of cubs observed by non-resident hunters is a result of this low reproductive rate, mortality of cubs as a result of predation by mature males (Bunnell and McCann 1993), or some combination of these two factors.

Table 11. Black bear and grizzly bear observations reported by non-resident hunters in the Mackenzie Mountains, 1997.

	Black bear		Grizzly bear	
	Cub	Adult	Cub	Adult
Total number seen	2	3	70	306
Number of hunters reporting	96	96	110	170
Number of hunters that saw at least one	2	3	32	129
Mean number seen	0.0	0.0	0.6	1.8
Standard deviation	0.1	0.2	1.5	2.3
Maximum number seen	1	1	12	17
Percent of the total number seen	40	60	19	81

Summary Data

Table 12. Outfitted non-resident hunter harvests in the Mackenzie Mountains, 1991-1997.

Year	Number of hunters	Dall's sheep	Woodland Caribou	Moose	Mountain goat	Wolf	Wolverine
1991	354	170	179	40	6	14	3
1992	364	203	142	32	4	7	0
1993	382	191	191	56	9	7	3
1994	356	199	164	46	5	15	2
1995	344	190	180	49	6	14	1
1996	387	201	175	46	4	11	4
1997	352	210	168	44	2	17	1
Mean 1991-1997	363	195	171	45	5	12	2

Table 13. Summary of ratios calculated from non-resident hunter observation reports in the Mackenzie Mountains, 1996 and 1997.

Year	Dall's Sheep		Woodland Caribou		Moose	
	Lambs: 100 ewes	Rams: 100 Ewes	Calves: 100 Cows	Bulls: 100 Cows	Calves: 100 Cows	Bulls: 100 Cows
1996	44	82	45	40	26	76
1997	57	55	36	21	30	107

Table 14. A comparison of horn and antler measurements among the period 1979-90 (as reported in Latour and MacLean 1994), the 1995 season (Veitch and Popko 1996), the 1996 season (Veitch and Popko 1997), and the 1997 season for ungulates harvested by non-resident hunting licence holders in the Mackenzie Mountains. All measurements are in centimeters unless otherwise shown and the sample size is given in brackets.

Measurement	1979 – 1990 mean	1995	1996	1997
Dall's sheep right horn length	90.4 (1755)	89.3 (189)	88.7 (201)	89.9 (203)
Dall's sheep horn annuli age (years)	9.5 (1755)	9.7 (189)	9.5 (200)	10.0 (206)
Woodland caribou right antler length	114.5 (1037)	116.5 (171)	116.3 (128)	116.2 (131)
Moose antler spread	139.8 (236)	143.7 (47)	142.4 (29)	147.2 (33)
Mountain goat right horn length	20.3 (17)	21.3 (5)	17.5 (2)	21.8 (2)

ACKNOWLEDGMENTS

Cooperation from the outfitters operating in the Mackenzie Mountains in 1997 was again very good and we appreciate the extra effort they showed in completing, signing, and sending us their harvest report forms. We thank Renewable Resources Officers of DRWED and clerks in Norman Wells, Fort Simpson, and Fort Liard for collecting and organizing data from non-resident hunters in their respective offices.

We also greatly appreciate the efforts, interest, and cooperation shown by the hunters and the more than 80 guides that completed the forms, reported observations of animals seen, and did the various antler and horn measurements. The comments we received from the hunters were much appreciated, even where they were less than complimentary to our way of doing things and to our weather!

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Appendix 1. Comments made by non-resident hunters in the Mackenzie Mountains, NWT on voluntary *Hunter Wildlife Observation Report* forms, 1997.

Note: we have done some correction of spelling, little correction of grammar, and have omitted specific outfitter and guides names.

Hunters' Comments

Many rams, several shots at 3 different rams on 3 different days in 3 different groups.
Numerous sheep, many caribou.
Very nice ram.
Few cow caribou.
Shot wrong ram due to lack of English language! A better older ram was in the group.
Nice curl but shot wrong ram. Larger, older ram was possible but hunter got too trigger happy. Guide was very disappointed because there was no need to shoot the younger animal.
Worked hard – excellent trip - very nice old ram.
Few cow caribou with calves.
Saw very large ram that got away.
Exceptional ram.
Old broomed ram.
Old broomed ram – ram in very poor condition - many mites in ears and many ticks on skin - pelage very poor.
Healthy animals – nose scars on ram harvested - moose and caribou tracks in area, but non seen.
Bad weather on hunt.
Bad teeth; poor health.
Ram was in good condition but had loose teeth.
Good healthy ram, lots of sheep viewed.
Healthy mature ram; good teeth.
Horns were very black and weathered looking, no fat on his body, teeth were loose. Ram walked very constricted assume arthritis. Some old winter hair remaining.
Bad weather.
Accidentally shot the wrong ram.
Ram was in good health.
Bad weather conditions.
Harvested ram had scarred leg with scabs and a limp; lump jaw.
Too many nuisance bears! One stole a caribou cape and chewed up the antlers. Otherwise, a great hunt and experience!
Saw lots of sheep during the two days sheep hunting. Had to go home early or would have seen more.
Had an excellent time and was treated very good by the outfitter and wildlife officer when checking in animals.
Great hunt and area. Too many bears. All game in great condition. Plenty of old rams. Lots of caribou.
Some hunting should be considered for grizzly bear.
Real good ewe, lamb ratio in area hunted, observed many class 5 rams.
There should be a season for bears bears bears. I seen mama moose and papa moose but I dint seen any baby moose . Cut the bear pupulation we have more moose. ok, thanks.
Open a grizzly bear hunt.

Observed many species of wildlife during my hunt. Overall it was an excellent hunting experience.
Scary encounter with Grizzly! It came within 50 yards - guide had to shoot twice to scare it away! I'm certainly glad it left. It looked very serious for a while!! I thought it might be him or us, but thankfully he decided to leave!!
Saw 7 grizzlies, one wolf. Sure wish I had a grizzly tag!!!
I would like to see a grizzly season, perhaps limited enter. The animal populations look very well managed. A great hunting experience.
Too many grizzly bears – you need to have a season on them - saw 9 bears in less than a mile from my sheep camp.
Saw lots of ewes and lambs - lots of bears.
Surprised about the amount of wolves seen in such a short time.
Lots of ewes and lambs – lots of bears.
Excellent treatment from everybody that I met. Keep up your excellent wildlife management program.
Saw plenty of game – condition seem excellent - moose seem very healthy of fat.
Too many grizzly bears. Bear sign everywhere. Very alarming in light of fresh meat in camp after harvesting animal. A human life is at great risk as concentration & density of numbers are much higher than expected.
Too many bears, guide and outfitter were great, country was beautiful.
Great hunt, too many bears. Seen lots of good game, one close encounter of the grizzly kind, almost too close.
Appears to be too large a number of bear sign and sightings, especially my first trip.
Saw 5 grizzly, saw grizzly chase away caribou, in one valley.
You need to open up grizzly bear hunting in the Mackenzies.
There should be a season for grizzly bears. I think the grizzly bears are killing a lot of moose calves. I saw five grizzly bears in five days that's a lot of bears. Came face to face with two bears (hunters harassment).
Lower jaw appears to have been severely injured some time ago. Teeth were in very poor shape - Ram 12.5 years old - Ram was dwarf - No fat – very lean meat.
Open areas to bear hunting.
Very nice area for hunting. Beautiful area, our guide was excellent.
Excellent, I had a great time.
Rams killed were quite thin, no fat – some with winter hair - Late spring? Too many flies - Poor percentage of calf caribou - lots of mosquitoes – none flies.
I had a very wonderful time and experience and would recommend it to anyone. On 8 Sept, a grizzly bear attacked the river float craft. The bear punctured all five sections of the float craft. Shot above the bear and he disappeared in the river.
I had a great time. An experience of a lifetime. Many thanks to the outfitter and all who helped. I did feel a little apprehensive with the bears.
Excellent hunting.
We spent 4.5 days out of 7 days in our tent due to weather it would have been nice to have a tent that we could set up and maybe cook out of the rain and snow.
Game seemed abundant. Spent 3 days in sheep area & 4 days in lower river basin looking for caribou. Weather fairly warm & it appeared majority of caribou were higher up. Saw a wolf pack go down the valley & return. Saw a large grizzly for 2 for 3 days.
I had a very professional guided trip with XX. The trip to the NWT was a very positive experience. I would strongly recommend XX to anyone. He runs a good operation by the book.
My hunt was an outstanding adventure, in a beautiful area with an excellent outfitter, and I do plan to return.
Too many bears. Numerous small caribou bulls, numerous caribou cows and numerous caribou calves.

Wonderful experience - bears made me nervous. Beautiful country - outfitter excellent.
Professional in every way. I had a very good time.
Too much paper work, no time for hunting.
Excellent hunt.
Too many bears around camp. Should issue license to outfitters.
Adequate numbers and size of game. Great service by the outfitters. Great weather. I would like to see much more of this type of activity made available to the public.
Seems to be very good sheep and caribou population with good lamb and young animal recruitment.
Grizzly bear activity seems to be increasing since earlier visits. Lots of different bear sign in all drainages.
Very excellent experience in all regards.
Saw many cow/calf caribou as well as bulls. Saw grizzly and wolf tracks around camp. Saw wolverine on my caribou gut pile. Wonderful area, great camp.
There should be a season for grizzly bears.
There are a lot of bears - How come there isn't a season??
Excellent hunting. Need to open grizzly bear will improve population.
Excellent number of sheep and caribou.
Very good outfitter.
Vast country breathtaking and challenging
Wonderful experience shared with my 12 year old son who accompanied me. XX and YY run a wonderful camp in a wonderful area! A dream come true, great guides, great people.
A great experience. It was everything I expected! The outfitter is the best and the country was beautiful! A hunt of a life time.
Excellent.
XX was an excellent outfitter - the best I have been with.
Very nice area. All the people I came in contact with were very nice and helpful.
XX is a very honest, hard working outfitter who does everything in his power to make sure the hunter has an unforgettable experience.
An excellent experience. Saw a lot of sheep and caribou. Excellent guide and outfitter.
Excellent Guide service. Very good hunting experience!
Excellent outfitter - best I have hunted with in Canada (8 previous hunts).
Excellent time, will be back.
Weather very warm so that usual number of caribou weren't seen.
A fabulous experience. Outstanding outfitter. Works hard for all his hunters. Professional guides.
This hunt was above and beyond my wildest dreams. I have never had a better time in all my life.
There are too many grizzly bears in this unit! They are very much a threat to hunters' safety - I would like to suggest at least some harvest of these bears.
The experience of the Mackenzie Mountains is spectacular, the vastness is overwhelming. The game in the NWT in my estimation is very well managed. XX is a very knowledgeable outfitter, quite accommodating to hunters wants and needs.
Wonderful area. XX is an exceptional outfitter and YY a fantastic guide. I have hunted all over North America and the Mackenzies are at the top of my list.
Fantastic hunting experience.
Outstanding area. Enjoyed my hunting experience.
Lots of fun and great guides and a real good cook.
XX runs a very professional camp. His guides are very knowledgeable and very observant of all game laws and fair hunting practices. My hunt was shortened since I only came for caribou and shot a good one early!
Herd of wolves.

There are way, way too many grizzlies.
I thought telegraph wire along Canol Trail should be removed mile 130-160 on ground and in air. This wire is acting as a snare to wild game.
Was not hunting moose, so was not in good moose habitat.
Herd of wolves.
Good hunt - good outfitter – good guides - good cook - good weather. Saw one grizzly near camp.
The Mack. Mountains are without question some of the most beautiful & remote in the world. This was my second trip to the area & it reinforced my first impression back in 1993. Don't allow it to be ruined as so many other pristine areas have been in the past.
It would be nice to be able to take our trophies home with us through Watson Lake, other than that, it was a really great experience.
Beautiful country – Great outfitter - guides and camp help. Did not over state what to expect - The X outfitters are a benefit to this area.
XX runs great operation. Hunting operation was great and I was impressed with the way they cared for camp sites, etc. to limit impact. Access from Watson Lake makes export procedure difficult, however.
I had a great hunt. X is a class organization. I was not pleased with the Territories export permit process and the added inconvenience that it caused.
Excellent outfitting and hunting. Would like to obtain export permit through Watson Lake.
Grizzly sign all over - need a season - Flight connection through Watson Lake very poor not being able to export trophy when I left.
I think that the export tag system should be changed so that the hunters do not have to travel to Norman Wells. Thank you for allowing us to experience NWT and the Mackenzie Mountains.
Very pleasant hunting experience. X run a real nice camp would never hesitate to book with them again. The only thing a little upsetting was the inspectors didn't show up when they were supposed to issue the exportation permits.
Saw rams every day. Would recommend to anyone wanting to hunt the Mackenzie Mountains to do so. Quality of rams was beyond anything I expected. Ram quality in area is outstanding. The wildlife dept. needs to find a way to make it easier for hunter to get trophies out.
Real enjoyable time. Outfitter is excellent! Don't like the export permit system.
Very pleased with all the game seen. I seen grizzly tracks everyday and would come back to hunt them should the opportunity arise. Enjoyed my hunt to the fullest. I am disappointed that we hunters could not get our export papers and allowed to take our trophies home.
The hunt was excellent! The fish and game need to work on a better system for export licence and trophy fees. The hassle of getting both of these was the only bad experience of the hunt.
Excellent outfitter, highly recommend; beautiful country; very disappointed in export permit process. It cost us time and money. Very much enjoyed the NWT. I plant to return to hunt again.
I think that the caribou and moose population would benefit by having a season to control some of the grizzly bear population.
I think the export permit process is a bureaucratic mess. You should find a way to simplify the process.
Overall a super hunt and great outdoor experience. I would recommend it to anyone.
I'd sure feel better if you took the comments made by the hunters to heart.
Saw more caribou this hunt than on the previous hunt.
Due to the need to go to Norman Wells to get an export permit, I was not able to take my caribou home with me. An export permit should be obtainable at more sites.
It is very inconsiderate to not have a export office in Watson Lake now I will have to wait until October or November to get what I shot in August.

Open the grizzly bear season again as there seems to be too many bears. Would have shot a good caribou, but grizzly killed it. We fly out of Watson Lake. It would be nice if one could take own sheep home with us at this time. Needs a game warden.

Excellent outfitting operation! I expected to see more caribou, but numbers were adequate to keep things interesting. How about a grizzly season. Your export permit system is horrendous. You are stealing our meat or wasting it!

It's absolutely ridiculous that there is no quota system for a grizzly harvest. Furthermore, it must be bureaucratic job insecurity to not have a better system of compulsory registration (i.e. through Norman Wells). Why cannot the outfitter provide this?

Registration of animals killed is terribly awkward. Cannot other means of registration be made to accommodate hunters i.e. Watson Lake(?) or even the outfitter(?) The grizzly population appears to be very healthy. Can a season be opened for non residents?

Very good lamb survival – 90%. Grizzly sign in every location hunted. One bear stayed near camp. Will probably have to be dealt with sooner or later. Need a grizzly season.

You should seriously consider opening grizzly season to non-residents as there is more than huntable population. XX is a very good outfitter that the Dept. of Resources can be proud to have here.

Hunted in an outstanding remote wilderness area. Great outfitter and excellent guide. A first class operation.

We saw a 10 year old 40 inch ram. We had shots.

Great experience, would be better if grizzly bear hunting was permitted.

Bear Black, saw 13 hours of horse pasture, NE 15, approximately KH. [Authors' comment - We have no idea what this means either!]

Great experience.

Some of the most beautiful scenery in the world. A great outdoor experience - delayed by bad weather, lots of rain and flooding. When we got to where we wanted to hunt- surrounded by water & could not leave camp. No opportunity to get to sheep country.

We had the opportunity, after XX was done hunting for me and YY to harvest a Dall's sheep each! Which after 8 years of operations was very appreciated!

The band of rams which I harvested my sheep out of was truly impressive. There were 13 legal rams out of the 15 and half of them were 8.5 years old and up. It was awesome! My guide was super.

Very good hunting experience - very beautiful area.

I had a shot at an eleven + year-old ram, but hit the younger ram. He's more than the ¾, but I had chances on an older ram.

X operation is very professionally run. Game very abundant. Horses exceptional. All guides are quite knowledgeable. This hunt is highly recommended as long as a person can ride and walk a reasonable amount.

Fog, rain, and swollen rivers did not allow hunting access.

X is a first rate operation that is attentive to the wildlife and environment.

Excellent hunt, beautiful country, great outfit.

Excellent trip, lots of fun.

Too many wolves and would be nice to be able to hunt grizzly.

My suggestion would be to open a grizzly bear season for non residents. The wolf population seemed to be very high.

One of the best prepared hunts, camps and help. Good wilderness areas.

Had a great experience hunting in Mackenzie Mountains. Excellent services provided by X.

Appendix 2. Licenced Big Game Outfitters in the Mackenzie Mountains, Northwest Territories

G/OT/01 – ARCTIC RED RIVER OUTFITTERS
Kelly and Heather Hougen
P.O. Box 5988
Whitehorse, YT
Y1A 5L7
Ph/Fx: 867-633-4934

S/OT/01 – GANA RIVER OUTFITTERS
Bill and Carol McKenzie
P.O. Box 4659
Quesnel, BC
V2J 3J8
Ph: 1-800-661-0702
Fx: 250-992-8639

S/OT/02 - MACKENZIE MOUNTAIN OUTFITTERS
Stan and Helen Stevens
P.O. Box 5
Tomslake, BC
V0C 2L0
Ph/Fx: 250-786-5118

S/OT/03 – RAM HEAD OUTFITTERS
Stan and Debra Simpson
P.O. Box 89
Warburg, AB
T0C 2T0
Ph: 403-848-7578
Fx: 403-848-7550

S/OT/04 - NWT OUTFITTERS
Darrel and Duane Nelson
P.O. Box 1154
Glenwood, AB
T0K 2R0
Ph: 403-626-3643 or 626-3279
Fx: 403-626-3036

S/OT/05 - REDSTONE TROPHY HUNTS
David and Carol Dutchik
P.O. Box 621
Cochrane, AB
T0L 0W0
Ph/Fx: 403-932-2624

G/OT/01 – NAHANNI SAFARIS
Rick Furniss
11 Harbottle Road
Whitehorse, YT
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Appendix 3. Numbers harvested, mean ages (by horn annuli), and right horn contour length measurements (cm) of Dall's sheep rams harvested by non-resident hunters in the Mackenzie Mountains, 1965-1997. Data for 1967-1968 from Simmons (1969), for 1979-1990 from Latour and MacLean (1994), for 1991-1994 from Veitch and Simmons (in press), 1995-1996 from Veitch and Popko (1996, 1997).

Year	Number of Sheep Harvested	Age (Years)		Length of Right Horn	
		Mean	Sample Size	Mean	Sample Size
1967-1968	168	8.4	Unknown	86.4	168
1979	200	-	-	90.7	159
1980	180	-	-	89.9	127
1981	187	8.1	101	93.7	157
1982	126	8.7	98	89.7	124
1983	100	9.0	80	90.9	94
1984	102	8.4	98	91.2	99
1985	123	8.1	115	89.7	112
1986	154	8.8	132	88.4	153
1987	148	8.9	148	89.4	148
1988	177	9.8	166	91.7	161
1989	207	9.9	199	90.4	203
1990	219	9.8	200	90.2	218
1991	170	9.7	161	89.1	170
1992	203	9.7	199	88.0	202
1993	191	9.7	181	87.6	190
1994	199	9.5	191	88.6	196
1995	190	9.7	189	89.3	189
1996	201	9.5	200	88.7	201
1997	210	10.0	206	89.9	203

Appendix 4. Age structure of Dall's sheep rams harvested by non-resident hunters in the Mackenzie Mountains, 1991-1997.

	1997		1996		1995		1994		1993		1992		1991		Total	
Age	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
3.5	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
4.5	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0	1	0.1
5.5	0	0.0	1	0.5	1	0.5	0	0.0	1	0.6	1	0.5	2	1.2	6	0.5
6.5	1	0.5	5	2.5	4	2.1	7	3.7	8	4.4	8	4.0	8	5.0	41	3.1
7.5	12	5.8	21	10.5	16	8.5	32	16.8	23	12.7	21	10.6	22	13.7	147	11.1
8.5	39	18.8	47	23.5	49	25.9	36	18.8	24	13.3	46	23.1	30	18.6	271	20.4
9.5	52	25.1	56	28.0	51	27.0	42	22.0	51	28.2	46	23.1	30	18.6	328	24.7
10.5	58	28.0	36	18.0	34	18.0	43	22.5	29	16.0	33	16.6	22	13.7	254	19.1
11.5	24	11.6	26	13.0	14	7.4	17	8.9	27	14.9	23	11.6	28	17.4	159	12.0
12.5	15	7.2	6	3.0	14	7.4	10	5.2	10	5.5	16	8.0	12	7.5	83	6.3
13.5	4	1.9	1	0.5	5	2.6	0	0.0	7	3.9	2	1.0	5	3.1	24	1.8
14.5	2	1.0	0	0.0	1	0.5	4	2.1	0	0.0	2	1.0	2	1.2	11	0.8
15.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0	1	0.1
Total	206		200		189		191		181		199		161		1327	
>10-yrs	102		69		68		74		73		77		69		532	
%>10-yrs	49.5		34.5		36.0		38.7		40.3		38.7		42.9		40.1	
>12-yrs	21		7		20		14		17		21		19		119	
%>12-yrs	10.1		3.5		10.6		7.3		9.4		10.6		11.8		9.0	